A Biological Inventory of Breeding Birds at the Saint-Gaudens National Historic Site Cornish, New Hampshire

Final Report – September 2003

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Abstract
The 148-acre Saint-Gaudens National Historic Site was established in 1964 to preserve the properties associated with the life and cultural achievements of American sculptor Augustus Saint-Gaudens. A biological inventory of the breeding birds within the park was conducted in 2001 and 2002. A variety of field techniques were used to document the composition and distribution of birds in the park. A total of 85 bird species were detected during the 2-year project, 62 of which were confirmed or suspected of breeding within the park, 21 were considered local breeders that may nest occasionally or in the future on park lands, while 2 species were strictly transients. Of the 91 species expected to be found breeding in the park 76 (83.5%) were observed. Nineteen of the detected species (22%) appear either on the Partners in Flight (PIF) priority list for the Northern New England Region, or on the New Hampshire list of Endangered and Threatened Wildlife. During point count surveys, 59 species were detected, with an interpolated species richness of 64 (±3.16 SE). Nine species were detected at >50% of the survey points, including 3 (33%) listed by PIF as high conservation priorities for the Northern New England Region (Ovenbird, Blackburnian Warbler, and Veery). Additional PIF high priority species considered common within SAGA forests include Wood Thrush and Eastern Wood-Pewee. Chestnut-sided Warbler, another PIF high priority species, was a dominant passerine in the park's alder shrub-wetland. Broods of both Hooded Merganser and Wood Duck were confirmed on Blow-me-down Pond, although it did not appear that they used the nest boxes placed there. Management recommendations for SAGA include maintaining and/or enhancing mid-aged to mature forest conditions, and continuing the invasive, exotic plant control program. These goals will benefit the suites of species that are among the most frequently encountered and abundant, and also contains the majority of conservation priority species for the region. Recommendations for grassy areas include a delayed mowing regime to maintain the adjacent population of nesting Bobolink, and establishing Eastern Bluebird and American Kestrel nest boxes or appropriate snags to provide these species with potential nesting opportunities. Since the majority of conservation priority species breeding at SAGA are forest-breeding landbirds, a monitoring program for the park should target this group as a representative sample. However, since point count surveys limited to the park would have extremely low power to detect trends, developing a network of monitoring sites in the area is recommended.

Background and Purpose

Saint-Gaudens National Historic Site (SAGA) was formally established in 1964 by the National Park Service in order to preserve the properties associated with the life and cultural achievements of Augustus Saint-Gaudens, a famed American sculptor. Saint-Gaudens lived and worked as an artist in the Cornish Colony from 1885 to 1907. At present, the Historic Site and adjacent natural areas include approximately 148 acres of open and forested land.

The landscape at SAGA exhibits a mixture of vegetation contrasts and diverse topographic features. While the core of the property contains a variety of managed and planted lawns and gardens, the natural area is characterized by a diverse pattern of mixed deciduous and coniferous forests, a hemlock ravine, and shrub wetland, and emergent marsh. Located in the Connecticut River Valley, SAGA ranges in elevation from 100 to 180 m. A variety of natural resource inventories have been conducted over the past

few decades, documenting vascular plant and vertebrate species, with the exception of birds. Most recently, inventories of fish (1998), and reptiles and amphibians (2000) were completed. Management of the cultural landscape at Saint-Gaudens is an ongoing task and some natural resources may be influenced by such action. The park supports a diverse herptile community and is developing long-term monitoring protocols and vernal pool protection strategies. There is a need to update the park's bird inventory and conduct more in-depth breeding bird studies.

The broad goal of this inventory was to provide park managers with comprehensive, science-based information about breeding bird populations that occur within the park boundaries. This will help park staff develop stewardship priorities, formulate effective stand-specific management strategies, and help guide future monitoring goals. The specific goals of the inventory were to:

1) Develop baseline data on the composition, distribution, and relative abundance of breeding birds within SAGA;
2) Identify ecologically sensitive and/or habitats of management interest (e.g., nest sites of raptors and/or grassland species, etc.) where forest management and/or mowing regimes may be restricted.

To achieve these goals, the inventory was designed to meet the following basic objectives:

1) To document through field investigations the occurrence of at least 90% of the breeding bird species estimated to exist within the park;
2) To describe the distribution and relative abundance of any state and/or federally-listed Endangered and Threatened species, species of Special Concern, and/or exotics occurring within the park;
3) To provide information necessary to develop a general monitoring strategy and design tailored to specific threats and resource issues of the park, which can be implemented following the inventory.

Methods

Point Counts

Point count surveys were used to document most avian species and to establish a baseline from which to detect trends over time. The sampling frame was established in ArcView by overlaying a 250 m grid on top of park boundaries, cover types, and other GIS layers. A total of 11 point counts were established at the intersections of this 250 m grid with 2 exceptions; points 1 and 11 were moved (50 m and 100 m respectively) in order to locate them on SAGA land (Fig. 1, Appendix 4). The minimum distance between point counts was 250 m. During April 2001, these points were located in the field using a Trimble GPS unit and marked with flagging and aluminum tree tags.

All point counts were visited 3 times annually during the 2001 and 2002 breeding seasons (late-May through June), for a total of 6 visits/point. Each point was surveyed for 10 minutes, with each count divided into 3, 2, and 5 minute intervals. Observers counted all individual birds detected within 2 distance classes (within and beyond 50 m). Surveys were only conducted on mornings with favorable weather conditions, began within 15 minutes of sunrise, and ended within three hours. Species not detected during point counts, but observed between stations, were recorded for a species list.

I calculated frequency of occurrence and relative abundance for all species detected within the 50 m radius circle. For comparative purposes, these metrics were also calculated for those species detected using unlimited distance counts. I defined frequency of occurrence as the number of points at which a species occurred divided by the total number of points surveyed. Relative abundance was measured as the mean number of individuals divided by the total number of points surveyed.

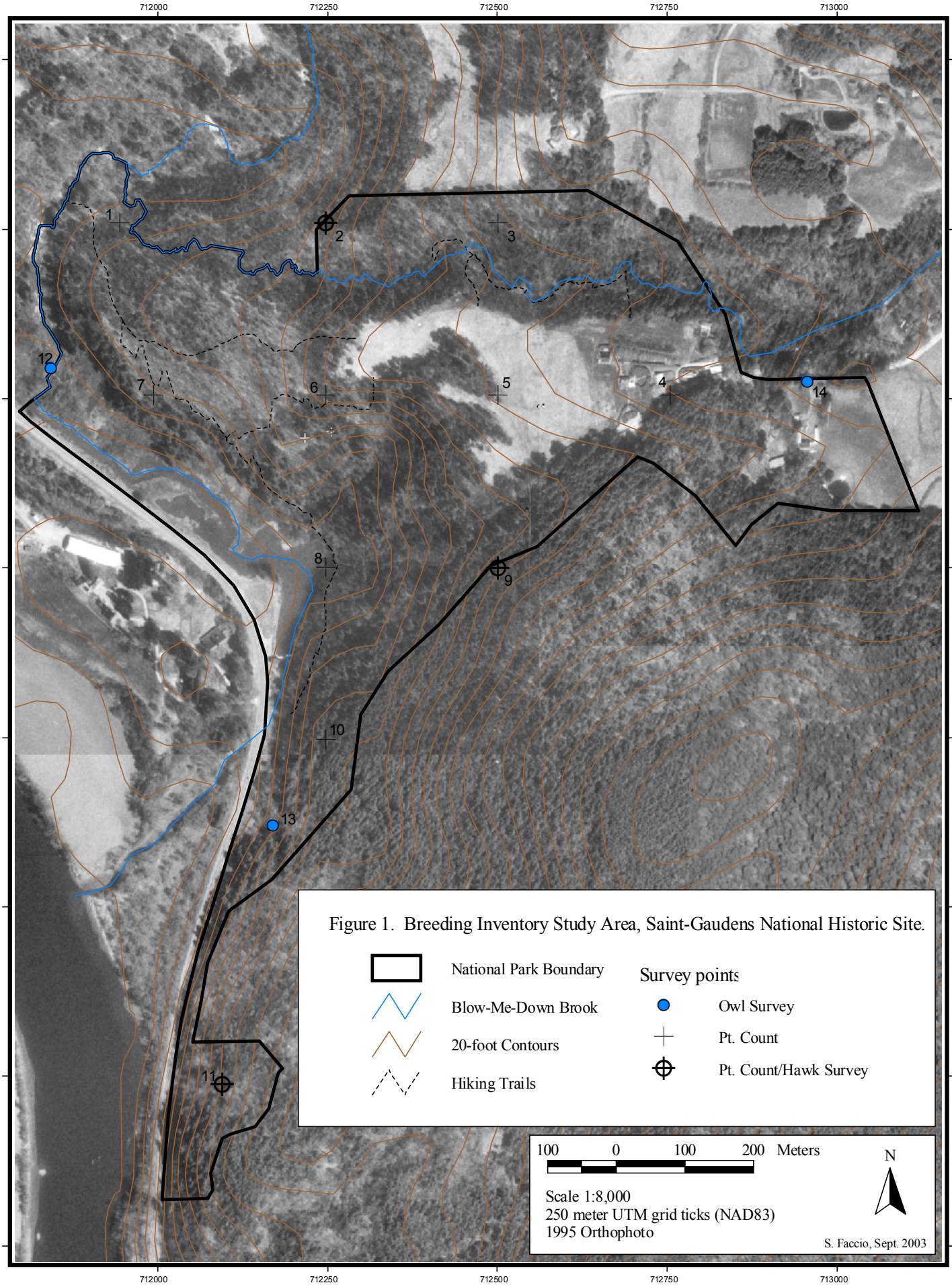

Figure 1. Breeding Inventory Study Area, Saint-Gaudens National Historic Site.

Species richness was calculated using the program SPECRICH (Hines 1996), which estimates the total number of species from empirical species abundance distribution data based on methods described by Burnham and Overton (1979). Although species richness was calculated for both distance classes, the value calculated from unlimited distance counts was used when interpreting results to avoid eliminating a species that may have only been detected outside the 50 m radius. I used Shannon's diversity index (H), which accounts for species richness, abundance, and evenness. In the formula below, *s* represents richness, and *p* is the proportionate representation of species *i* among the total number of species.

$$H = -\sum_{i=1}^{s} (p_i)(\ln p_i)$$

Because Shannon's index assumes that species do not differ in their detectability, I used the distance class which best supports this assumption (<50 m) when interpreting results.

Audio-Playback Surveys

Three nocturnal owl survey points were located at least 1 km apart in proximity to public roads to facilitate locating them at night (Fig. 1, Appendix 4). Each point was visited twice annually at least 30 minutes after sunset; once between 17 and 28 March and once between 5 and 15 April. At each point, the observer listened silently for 3 minutes and then broadcast an audio playback alternating between owl vocalizations and silent listening periods. The taped sequence was as follows: 20 seconds of Northern Saw-whet Owl calls, a minute of listening; 20 seconds of Eastern Screech Owl calls, a minute of listening; 20 seconds of Barred Owl calls, a minute of listening; 20 seconds of Great Horned Owl calls, a minute of listening. The total observation time at each station was 8:20 minutes.

Forest-nesting hawks were surveyed with audio-playback at a subset of 3 point count stations (Fig. 1). Each point, located in appropriate forested habitat and spaced at least 600 m apart, was visited twice during April and early May. Surveys consisted of 3 minutes of silent listening, followed by a broadcast of an audio playback alternating between hawk vocalizations and silent listening periods. The taped sequence was as follows: 10 seconds of Sharp-shinned Hawk calls, followed by a minute of listening; 10 seconds of Cooper's Hawk calls, a minute of listening; 10 seconds of Broad-winged Hawk calls, a minute of listening; 10 seconds of Red-shouldered Hawk calls, a minute of listening; 10 seconds of Northern Goshawk calls, a minute of listening; 10 seconds of Red-tail Hawk calls, a minute of listening. The total observation time at each station was 10 minutes.

Area Searches

Area searches for species not well surveyed by other methods, particularly hawks and waterfowl, were conducted in appropriate habitats between April 15 and July 30. Special attention was paid to locating raptor nests, as well as documenting wetland/waterfowl species breeding in park wetlands. During area searches, efforts were made to locate and monitor nests when appropriate.

All field work was conducted by S. A. Lousada, an experienced birder with excellent visual and aural identification skills.

Results and Discussion

A total of 85 bird species were detected during the 2-year inventory project. Of these, 62 species were confirmed or suspected of breeding within the park, 21 species were considered local breeders that may nest occasionally or in the future on park lands, while 2 species (Osprey, and Ruby-crowned Kinglet) were strictly transients (Table 1). Of the 91 species listed as potential breeders within the park (see Appendix 1), 76 (83.5%) were observed. However, the list included 9 raptor species (5 hawks, 4 owls),

Table 1. Status and abundance of 85 species detected during breeding bird inventory at Saint-Gaudens National Historic Site, Cornish, NH, 2001-2002. Species listed in taxonomic order.

Common Name	Scientific Name	Observation Method [a]	Park Status [b]	Abundance [c]	State/PIF Priority Rank [d]
Great Blue Heron	*Ardea herodias*	I	L	U	
Green-backed Heron	*Butorides virescens*	P, I	L	U	
Canada Goose*	*Branta canadensis*	I	L	U	
Wood Duck	*Aix sponsa*	I	B	C	
Hooded Merganser	*Lophodytes cucullatus*	I	B	U	
Mallard	*Anas platyrhynchos*	I	B	C	
Common Merganser	*Mergus merganser*	I	L	U	
Osprey*	*Pandion haliaetus*	I	M	U	T
Broad-winged Hawk	*Buteo platypterus*	I	L	C	
Red-tailed Hawk	*Buteo jamaicensis*	P, I	L	C	
Wild Turkey	*Meleagris gallopavo*	I	L	C	
American Woodcock*	*Scolopax minor*	I	L	C	I
Mourning Dove	*Zenaida macroura*	I	B	A	
Great Horned Owl*	*Bubo virginianus*	A	L	U	
Barred Owl	*Strix varia*	P, I	L	C	
Chimney Swift	*Chaetura pelagica*	I	L	C	II-C
Ruby-throated Hummingbird*	*Archilochus colubris*	P, I	B	C	
Belted Kingfisher	*Ceryle alcyon*	I	L	C	
Yellow-bellied Sapsucker	*Sphyrapicus varius*	P, I	B	A	
Downy Woodpecker	*Picoides pubescens*	P, I	B	C	
Hairy Woodpecker	*Picoides villosus*	P, I	B	C	
Northern Flicker	*Colaptes auratus*	P, I	B	C	
Pileated Woodpecker*	*Dryocopus pileatus*	P, I	L	C	
Eastern Wood Pewee	*Contopus virens*	P, I	B	A	II-A
Least Flycatcher	*Empidonax minimus*	P, I	B	A	II-A
Willow Flycatcher	*Empidonax traillii*	P, I	B	U	
Alder Flycatcher	*Empidonax alnorum*	P, I	B	U	
Eastern Phoebe	*Sayornis phoebe*	P, I	B	A	III
Great Crested Flycatcher	*Miarchus crinitus*	P, I	B	A	
Eastern Kingbird	*Tyrannus tyrannus*	I	B	C	
Blue-headed Vireo	*Vireo solitarius*	P, I	B	C	
Red-eyed Vireo	*Vireo olivaceus*	P, I	B	A	
Blue Jay	*Cyanocitta cristata*	P, I	B	A	
American Crow	*Corvus brachyrhynchos*	P, I	B	A	
Common Raven	*Corvus corax*	I	L	C	
Tree Swallow	*Tachycineta bicolor*	I	B	C	
N. Rough-winged Swallow*	*Stelgidopteryx serripennis*	I	L	U	
Black-capped Chickadee	*Poecile atricapillus*	P, I	B	A	III
Eastern Tufted Titmouse	*Baeolophus bicolor*	P	B	C	
Red-breasted Nuthatch	*Sitta canadensis*	P, I	B	C	
White-breasted Nuthatch	*Sitta carolinensis*	P, I	B	A	
Brown Creeper	*Certhia americana*	P, I	B	C	
Winter Wren	*Troglodytes troglodytes*	P, I	B	C	
Golden-crowned Kinglet*	*Regulus satrapa*	P	B	U	
Ruby-crowned Kinglet*	*Regulus calendula*	I	M	U	
Eastern Bluebird*	*Sialia sialis*	I	L	U	
Veery	*Catharus fuscescens*	P	B	A	II-B
Hermit Thrush	*Catharus guttatus*	P, I	B	C	
Wood Thrush	*Hylocichla mustelina*	P, I	B	C	I

Table 1. Cont.

Table 1. Continued.

Common Name	Scientific Name	Observation Method [a]	Park Status [b]	Abundance [c]	State/PIF Priority Rank [d]
American Robin	*Turdus migratorius*	P, I	B	A	
Gray Catbird	*Dumetella carolinensis*	P, I	B	C	II-A
European Starling*	*Sturnus vulgaris*	I	L	C	
Cedar Waxwing	*Bombycilla cedrorum*	P, I	B	C	
Northern Parula	*Parula americana*	P, I	B	U	
Yellow Warbler	*Dendroica petechia*	P, I	B	C	
Chestnut-sided Warbler	*Dendroica pensylvanica*	P, I	B	C	I
Magnolia Warbler*	*Dendroica magnolia*	P	B	U	
Yellow-rumped Warbler	*Dendroica coronata*	P, I	B	C	
Black-throated Green Warbler	*Dendroica virens*	P, I	B	A	
Blackburnian Warbler	*Dendroica fusca*	P, I	B	A	I
Pine Warbler	*Dendroica pinus*	P, I	B	A	
Black-and-White Warbler	*Mniotilta varia*	P, I	B	C	III
American Redstart	*Setophaga ruticilla*	P, I	B	C	III
Ovenbird	*Seiurus aurocapillus*	P, I	B	A	II-B
Louisiana Waterthrush	*Seiurus motacilla*	P, I	B	U	
Common Yellowthroat	*Geothlypis trichas*	P, I	B	C	
Canada Warbler*	*Wilsonia canadensis*	I	L	U	I
Scarlet Tanager	*Piranga olivacea*	P, I	B	C	II-A
Chipping Sparrow	*Spizella passerina*	P, I	B	A	
Savannah Sparrow*	*Passerculus sandwichensis*	I	L	U	
Song Sparrow	*Melospiza melodia*	P, I	B	A	
Swamp Sparrow	*Melospiza georgiana*	P, I	B	U	
White-throated Sparrow*	*Zonotrichia albicollis*	I	B	C	
Dark-eyed Junco	*Junco hyemalis*	I	B	C	
Northern Cardinal	*Cardinalis cardinalis*	I	B	U	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	P, I	B	C	II-A
Indigo Bunting	*Passerina cyanea*	I	B	U	
Bobolink*	*Dolichonyx oryzivorus*	I	L	U	II-C
Red-winged Blackbird	*Agelaius phoeniceus*	P, I	B	C	
Common Grackle	*Quiscalus quiscula*	P, I	B	C	
Brown-headed Cowbird	*Molothrus ater*	P, I	B	C	
Baltimore Oriole	*Icterus galbula*	P, I	B	C	
Purple Finch	*Carpodacus purpureus*	P	B	U	II-A
Pine Siskin*	*Carduelis pinus*	I	L	U	
American Goldfinch	*Carduelis tristis*	P, I	B	A	

* Species detected in only one survey year

[a] Observation Method; P = Point count survey, I = incidental observation, A = Audio playback survey

[b] Park Status; B = breeds in park, L = local breeder, M = migrant only

[c] Abundance in Park; A = abundant, C = common, U = uncommon, R = rare

[d] Partners In Flight Priority Rank for physiographic region 27 (Northern New England);

I = High Overall Priority

II-A = High Regional Concern, II-B = High Regional Responsibility, II-C = High Regional Threats

III = Additional Watch List Species

New Hampshire State Rank

T = New Hampshire State Threatened

of which any could potentially nest in the park, although given the park's small size I did not expect more than 1 or 2 species from each group to have a portion of their breeding territories within the study area. Nineteen of the detected species (22%) appear on the Partners in Flight (PIF) priority list for the Northern New England Region (physiographic region 27) (Rosenberg and Hodgman 2000), while Osprey appears on the New Hampshire list of Endangered and Threatened Wildlife (http://www.wildlife.state.nh.us/Wildlife/Nongame/endangered_list.htm).

Point Count Surveys

A total of 834 individuals of 59 species were detected using unlimited distance point count surveys (Table 2, Appendix 3). Of these, 337 individuals of 49 species were detected within 50 m of point count stations (Table 2). Nine species were detected at >50% of the survey points, including 3 (33%) that are listed as PIF Tier I or Tier II priority species for the Northern New England Region (NNER); Ovenbird, Blackburnian Warbler, and Veery. Blackburnian Warbler is listed as Tier I species, those with a high overall priority for which the region has a high responsibility for conservation (Panjabi 2001). An additional PIF priority species detected at a relatively high frequency (>25% of points) was Wood Thrush, also a Tier I species.

Eastern Wood-Pewee, ranked as a Tier II species, appeared to be very uncommon within the park based on data from the <50 m distance class (1 individual) (Table 2, Appendix 2). However, using unlimited distance counts, pewee was the 8th most abundant species and one of only four detected at all 11 points (Table 2, Appendix 3). It is unclear why this species appeared to be under-represented within 50 meters of point counts. Out of 841 Eastern Wood-Pewee detections from 22 study sites surveyed by the Vermont Forest Bird Monitoring Program (FBMP), 537 (64%) occurred in the <50 m distance class, suggesting that this species is not typically under-represented within 50 m of point counts (Faccio unpubl. data). Unlimited distance counts at SAGA indicate that this species was relatively evenly distributed throughout the study area (Appendix 3), a result that was supported by encounters during area searches.

The interpolated species richness of 64 (±3.16 SE) was well below the 85 species detected using all observation methods, in part due to the high number of wetland species that are not effectively surveyed by point count. The Shannon Diversity index (H) of 4.088 for birds detected within the 50 m distance class (Table 2) was similar to that calculated for breeding birds at the Marsh-Billings-Rockefeller National Historical Park in nearby Woodstock, VT during the same time period (H = 3.801) (Faccio 2003).

The 5 most abundant species in the <50 m distance class were: American Robin, Red-eyed Vireo, Ovenbird, Veery, and Black-throated Green Warbler. Using unlimited distance count data for comparison, these species remained among the most abundant, but Brown-headed Cowbird detections exceeded those of Black-throated Green Warbler (Table 2, Appendix 3). This brood parasite was detected at a disproportionately high number at point 5, owing to a group of 10 individuals observed in the adjacent grassy field on 7 June 2002. Due to the park's proximity to agricultural lands that are frequented by cowbirds, some passerines may experience reduced productivity at SAGA due to brood parasitism.

The relatively small size of the park and the limited number of sampling points precluded any meaningful analyses of bird associations among different forest types.

Audio-Playback Surveys

The audio-playback surveys for hawks and owls had poor success. Only 1 owl responded to the broadcast calls. On 8 April 2002 (19:54 hrs), at survey point 12 (Fig.1, Appendix 4), a Great Horned Owl responded vocally during the silent listening period following the Great Horned Owl segment of the tape. The bird called repeatedly every 19-20 seconds, first from the west at approximately 50-100 m away, then

Table 2. Relative abundance, frequency of occurrence, and species richness and diversity for all point count surveys at 2 distance classes, Saint-Gaudens National Historic Site, Cornish, NH, 2001-2002. Species listed by relative abundance < 50 m.

	< 50 m		Unlimited Distance	
Species	Relative abundance	Frequency	Relative abundance	Frequency
American Robin	0.727	0.909	1.318	1.000
Red-eyed Vireo	0.682	0.909	1.318	1.000
Ovenbird	0.682	0.636	1.273	1.000
Veery	0.545	0.818	1.045	0.818
Black-throated Green Warbler	0.545	0.727	0.818	0.909
Black-capped Chickadee	0.455	0.636	0.500	0.636
Chipping Sparrow	0.409	0.182	0.591	0.273
Blackburnian Warbler	0.364	0.636	0.455	0.727
White-breasted Nuthatch	0.318	0.545	0.409	0.636
American Redstart	0.318	0.636	0.409	0.727
Pine Warbler	0.273	0.455	0.682	0.636
Brown Creeper	0.227	0.273	0.273	0.273
Brown-headed Cowbird	0.227	0.273	0.864	0.636
Wood Thrush	0.182	0.364	0.455	0.727
Cedar Waxwing	0.182	0.182	0.182	0.182
Yellow-bellied Sapsucker	0.136	0.273	0.182	0.364
Downy Woodpecker	0.136	0.273	0.182	0.545
Least Flycatcher	0.136	0.091	0.182	0.091
American Crow	0.136	0.182	0.455	0.818
Song Sparrow	0.136	0.182	0.409	0.455
Baltimore Oriole	0.136	0.182	0.182	0.545
Barred Owl	0.091	0.091	0.136	0.182
Hairy Woodpecker	0.091	0.273	0.091	0.273
Great Crested Flycatcher	0.091	0.182	0.227	0.545
Blue-headed Vireo	0.091	0.273	0.091	0.364
Blue Jay	0.091	0.273	0.409	0.909
Winter Wren	0.091	0.182	0.136	0.182
Northern Parula	0.091	0.182	0.182	0.182
Yellow-rumped Warbler	0.091	0.273	0.273	0.455
Louisiana Waterthrush	0.091	0.182	0.182	0.364
Swamp Sparrow	0.091	0.091	0.136	0.182
Red-winged Blackbird	0.091	0.091	0.364	0.364
Common Grackle	0.091	0.091	0.091	0.091
Purple Finch	0.091	0.091	0.091	0.091
Ruby-throated Hummingbird	0.045	0.091	0.045	0.091
Northern Flicker	0.045	0.091	0.091	0.182
Eastern Wood Pewee	0.045	0.091	0.636	1.000
Eastern Phoebe	0.045	0.091	0.091	0.182
Eastern Tufted Titmouse	0.045	0.182	0.091	0.364
Red-breasted Nuthatch	0.045	0.091	0.091	0.273
Golden-crowned Kinglet	0.045	0.091	0.091	0.091
Hermit Thrush	0.045	0.091	0.136	0.545
Chestnut-sided Warbler	0.045	0.091	0.273	0.455
Magnolia Warbler	0.045	0.091	0.045	0.091
Black-and-White Warbler	0.045	0.182	0.091	0.182
Common Yellowthroat	0.045	0.091	0.136	0.364
Scarlet Tanager	0.045	0.182	0.273	0.727
Rose-breasted Grosbeak	0.045	0.091	0.318	0.636
American Goldfinch	0.045	0.091	0.045	0.182
Mourning Dove	-	-	0.227	0.455
Yellow Warbler	-	-	0.182	0.182
Northern Cardinal	-	-	0.182	0.545

Cont.

Table 2. Continued

Species	< 50 m		Unlimited Distance	
	Relative abundance	Frequency	Relative abundance	Frequency
Gray Catbird	-	-	0.136	0.273
Alder Flycatcher	-	-	0.091	0.182
Indigo Bunting	-	-	0.091	0.182
Green-backed Heron	-	-	0.045	0.091
Red-tailed Hawk	-	-	0.045	0.091
Pileated Woodpecker	-	-	0.045	0.182
Willow Flycatcher	-	-	0.045	0.091
Total Relative Abundance	7.000		13.500	
Number of Species Detected	49		59	
Shannon Index	4.088		4.518	
Species Richness[a]	59 ±4.47 SE		64 ±3.16 SE	

[a] Interpolated species richness as determined by the program SPECRICH

from the same distance to the north, before calling again ca. 25 m south of the listening station. In addition, 3 Barred Owls were observed during point count surveys, and they were occasionally seen during active searches (Table 1, Appendix 3). While Barred Owl was not confirmed to be breeding within the park, on 8 June 2001 a pair was observed near point count 2.

Although no hawks responded to the taped broadcasts of forest hawk calls, 3 species (Broad-winged Hawk, Red-tailed Hawk, and Osprey) were observed incidentally or during point count surveys (Tables 1 and 2). While none of these species were confirmed as breeding within the park, Broad-winged and Red-tailed hawks appeared to have territories that included at least a portion of SAGA lands, as both were encountered on several occasions.

Area Searches

Active searches in different areas of SAGA were conducted on 10 occasions. In 2001, five searches were conducted between 8 June and 9 July, and in 2002, five area searches occurred between 1 May and 26 June. Although these data are more qualitative, they provided information about areas or species not well-surveyed using point counts, and helped confirm the presence of several breeding species. A total of 12 breeding occurrences for 9 species were confirmed within the park. These included 3 nests with eggs (American Robin, Ovenbird, Wood Thrush), 2 Yellow-bellied Sapsucker nests with young, 5 family groups (2 Wood Duck, 2 Hooded Merganser, and 1 Red-winged Blackbird), an adult Northern Cardinal carrying food, and an adult Cedar Waxwing gathering nesting materials.

The wetland area along the park's western boundary contained several species that were not well-surveyed using point counts. The wetland area was thoroughly surveyed on foot on several occasions and once by kayak. Common Yellowthroat, and Yellow and Chestnut-sided warblers (the latter a PIF Tier I species) were the dominant species, particularly in the alder shrub-wetland south of point count 7 (Fig. 1). Both Alder and Willow flycatchers maintained territories within this area as well. Swamp Sparrow, Red-winged Blackbird, Common Grackle, Green-backed Heron, and Mallard were frequently seen or heard, and at least two pairs of both Wood Ducks and Hooded Mergansers bred successfully here.

Management Recommendations

Management practices at SAGA have been implemented primarily to preserve the historic cultural landscape, increase recreational opportunities, and enhance aesthetic and wildlife values. This consists

primarily of maintaining gardens and ornamental plantings, mowing open areas, trail maintenance, and removal of trees deemed hazardous. In addition, an exotic plant management plan has recently been implemented which includes removal of invasive alien vegetation, primarily purple loosestrife (S. Walasewicz, pers. comm.). While it is unknown how past management practices at SAGA have affected the bird community, the following recommendations are intended to guide the development of an ecologically sound management plan that will promote biological conservation while maintaining the historical, educational, aesthetic, and recreational values of the land.

Forest Management

Among the 13 forest bird species identified as conservation priorities, only 3 exhibit a preference for forests that are in the early stages of regeneration (Table 3). All 3 of these species were primarily encountered in the wetland area, and Gray Catbird and Chestnut-sided Warbler were locally common here, where hydrological regimes maintain the dense shrubby habitat they prefer. One species from this group (American Woodcock), along with Veery, occur in sapling to pole-size stands, although Veery is often associated with older forest types as well. Four priority species occur in semi-open forests, in which partial cutting or natural disturbance creates structural heterogeneity. The majority of priority species that inhabit woodlands are associated with mid-aged or mature forests (62%), particularly hardwood and/or mixedwoods. These species were also among the most-abundant in the study area. Only 3 priority species show a preference for mature softwoods, and none are exclusively found in softwoods.

Table 3. Seral stage associations of forest-dwelling bird species identified as conservation priorities by Partners in Flight present at SAGA. An x denotes preferred habitat.

Species	Regeneration to Seedling	Sapling to Pole-size	Semi-open or Disturbed Forest	Mid-Age	Mature Hardwood	Mature Mixedwood	Mature Softwood
American Woodcock	x	x					
Eastern Wood Pewee					x	x	
Least Flycatcher				x	x		
Veery		x	x	x			
Wood Thrush				x	x	x	
Gray Catbird	x						
Chestnut-sided Warbler	x						
Blackburnian Warbler				x		x	x
Ovenbird				x	x	x	
Canada Warbler			x				
Scarlet Tanager				x	x	x	
Rose-breasted Grosbeak			x	x	x	x	
Purple Finch			x	x		x	x
Totals	**3**	**2**	**4**	**8**	**6**	**7**	**2**

Habitat designations are based primarily on Hagan and Grove (1999), Hagan et al. (1997), and Thompson and Capen (1988).

In terms of bird populations, little forest management is necessary at SAGA to maintain and/or enhance mid-aged to mature forest conditions that will benefit the suite of species that are among the most frequently encountered and abundant, and contains the majority of conservation priority species for the region. Two PIF Tier I species are included within this suite (Blackburnian Warbler and Wood Thrush), each of which have somewhat different habitat requirements. Blackburnian Warbler, an abundant species encountered at 64% of SAGA census points, is a canopy specialist found in mature, mixed deciduous-coniferous stands, especially those with hemlock or spruce in the canopy (Morse 1994). This species gleans insects from both deciduous and coniferous foliage, and nests almost exclusively in coniferous trees. The Wood Thrush, which was found at 36% of SAGA point counts, primarily occupies mature deciduous and mixed woodlands with a relatively high diversity of deciduous tree species, moderate sub-

canopy and shrub density, and a fairly open forest floor with high soil moisture (Roth et al. 1996).

Among PIF Tier II species within this suite, Ovenbird and Veery were among the most abundant and frequently encountered species within the study area, found at 64% and 82% of point counts, respectively (Table 2). The Ovenbird is found in a variety of mature forest conditions, although they reach maximum abundance within closed canopy forests with open understories (Van Horn and Donovan 1994). In contrast, the Veery prefers moist forests with dense understories, hence are often found in earlier seral stages and lower elevation floodplain areas (Moskoff 1995).

Wetland Management

The alder wetland, emergent marsh, and open water of the dam-controlled Blow-me-down Pond, is an area rich in avian life. Management efforts to control invasive, exotic plants, particularly purple loosestrife and Japanese Knotweed, should be continued. Little other management is necessary in this area to maintain a rich diversity of birds. Two PIF Tier I species were found in this area (American Woodcock and Chestnut-sided Warbler), although the former species was only detected in 2002 and was not confirmed nesting. Chestnut-sided Warbler however, was a dominant nesting species within the alder shrub-wetland. Typically associated with deciduous second growth of large forest clearcuts, this species also utilizes shrubby, early successional growth associated with beaver wetlands and river floodplains (Richardson and Brauning 1995). Alder wetlands tend to be relatively stable environments, although some may succeed to mature forest over time depending primarily on hydrological regime. Long duration or frequent flooding favor the more tolerant shrub species and tend to prevent most tree species from maturing (Thompson and Sorenson 2000). Because Blow-me-down Pond is controlled by a mill dam, annual water levels should be fairly consistent over the long term, reducing the likelihood that succession will convert the alder wetland to mature forest, as would be the natural cycle with beaver-controlled wetlands.

At least 5 Wood Duck nest boxes have been erected in the open water of Blow-me-down Pond. However, it is unclear whether these boxes were used by any of the 4 broods of cavity-nesting waterfowl observed in 2001. On 9 July 2001, S. Lousada used a kayak to inspect 5 nest boxes and found them all empty, with no sign of use, suggesting both Wood Duck and Hooded Mergansers that were observed with broods nested in natural cavities. There is evidence that intraspecific egg-dumping, which may reduce productivity, is common among both Wood Duck and Hooded Merganser, especially when artificial nest boxes are located in open, highly visible areas, such as those at SAGA (Hepp and Bellrose 1995). Managers at SAGA may consider relocating some of the nest boxes to less-conspicuous locations and monitor the results. Regardless, the nest boxes present at SAGA should be maintained annually. This is best accomplished in winter when ice makes them easily accessible. Each box should be inspected for use, and any unhatched eggs or large shell fragments removed, before adding fresh sawdust or shavings to a depth of 4-6 inches.

Maintenance of Mowed Areas

There are 3 separate grassy areas totaling ca. 25 acres that are maintained by weekly or annual mowing (Fig. 1). Outside of the lawn area directly around the buildings, much of the large, ca. 15 acre field west of the headquarters building is mowed once a year in early fall, although portions are mowed weekly to accommodate parking during large events. This area could likely support up to 3 pairs of Eastern Bluebirds and several pairs of Tree Swallows if suitable nest boxes were erected properly. Currently, several nest boxes are mounted on trees at the field edge, and are not suitable for either species due to location, and in some cases box size. Nest boxes with an entrance hole measuring 30 mm should be mounted on poles at least 20 m away from the forest edge. Some evidence suggests that placement of multiple boxes in close proximity reduces interference between bluebirds and Tree Swallows (Gowaty and Plissner 1998). Similarly, nest boxes could be placed at the field at the park's eastern border south of the road, and at the grassy area near the mill along Rt. 12A.

A breeding population of Bobolinks is apparently present in the hayfield bordering the park's eastern boundary south of the road (S. Lousada, pers. comm.), and may occasionally nest within the park's boundary. This PIF Tier II priority species has reduced breeding success in most of the region's hayfields that are mowed for high quality hay (Jones and Vickery 1997). To help maintain this breeding population, and avoid destroying nests and young, this field should only be mowed after August 1st. In addition, consider delaying mowing until late-August to allow the development of late-blooming wildflowers, lepidopterans, odonates, and other invertebrates. This will enhance the quality of the habitat for Bobolinks, which prefer a mosaic of grasses, sedges, and broad-leaved forbs.

The 2 largest fields at SAGA, combined with other large fields on adjacent lands (see Fig. 1) have the potential to support a breeding pair of American Kestrels, another PIF Tier II priority species. An obligate secondary cavity nester, kestrels require a minimum of 45 acres of open habitat covered with short vegetation around their nest site (Smallwood and Bird 2002). In addition, they prefer cavities in large snags (especially those excavated by Northern Flickers), or nest boxes with unobstructed entrances. Snags, particularly along field edges, are rare at SAGA, and may be a limiting factor for this and other secondary cavity nesters. Consider erecting 1 or 2 kestrel nest boxes on poles to provide this species with potential nesting opportunities. Suitable locations would be near the western edge of the large field west of the headquarters, and the southeastern corner of the east field. Alternately, girdle several trees in these areas to provide snags in which Northern Flickers may excavate nest sites that could be used by kestrels in the future.

Recommended Monitoring Strategy

Since the majority of conservation priority species breeding within SAGA are forest-breeding landbirds, a monitoring program for the park should target this group of birds as a representative sample. However, due to the SAGA's small size, point count surveys limited to the park would have very low power to detect trends for all but the most abundant species present. For example, I used the freeware program MONITOR (Gibbs 1995) to determine the power of detecting declining trends for a moderately-abundant species (Wood Thrush) using point count data collected at 35 stations during a 2-year breeding bird inventory at Marsh-Billings-Rockefeller National Historical Park (Faccio 2003). The analysis was run using 500 simulated data sets modelled using exponential trends, two-tailed hypothesis testing, a coefficient of variation (CV) of 0.52, and an alpha level of 0.10. The results of this simulation revealed that after 10 years of monitoring, the power to detect a 3% annual decline in Wood Thrush abundance was just 40% (Fig. 2). Thus, it would be possible that low to moderately abundant species could exhibit long-term declines before the monitoring program collected enough data to detect declines (Peterman and Bradford 1987). A power analysis conducted with data from the Ontario FBMP, indicate that 150 point count stations would be required to detect 2-3% annual declines (18-26% decline over 10 years) for the majority of landbird species with adequate power (80%) (Schalk et al. 2002). Similarly, a power analysis conducted using data from the Vermont FBMP, indicated that 75 point count stations detected a 5% decline in Ovenbirds (low CV) and a 6% decline in Hermit Thrush (moderate CV) over 10 years with a minimum of 80% power, while 15 years of monitoring were required to detect a 3% decline (Table 4) (Faccio et. al. 1998).

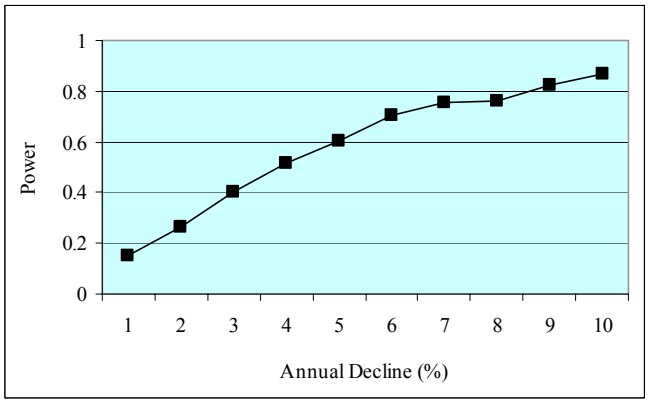

Fig. 2. Power to detect 1-10% annual declines in Wood Thrush abundance after 10 years of monitoring at 35 point counts at MABI.

Table 4. Power to evaluate trends for species with low variability (Ovenbird) and moderate variability (Hermit Thrush) occurring at 15 VT FBMP study sites, each with 5 point count stations and 2 counts/year.

Years Monitoring	Annual Decline (%)	Ovenbird (low CV) Power	Hermit Thrush (moderate CV) Power
10	6	0.97	0.86
	5	0.91	0.78
	4	0.79	0.63
	3	0.61	0.44
	2	0.37	0.23
15	6	1.00	1.00
	5	1.00	0.99
	4	1.00	0.95
	3	0.97	0.86
	2	0.76	0.61
20	6	1.00	1.00
	5	1.00	1.00
	4	1.00	1.00
	3	1.00	0.99
	2	0.98	0.89

Therefore, since the birds at SAGA represent a metapopulation from throughout the region, I recommend developing a network of study sites within the bioregion that, when combined with point count stations already established at SAGA, would provide the necessary sample size (100 – 150 points) to detect annual declines of 2-3% with adequate power (80%). Such a "Regional Monitoring Strategy" could be established on a variety of private and public forest lands, including those owned by the State and Town Forests, State Wildlife Management Areas, Marsh-Billings-Rockefeller National Historical Park, and others. Each study site would consist of at least 100 acres of suitable forest habitat in which a series of 5 point count stations are spaced at least 200 m apart. All points will be surveyed twice annually using the protocol of the Vermont FBMP (Faccio et al. 1998). If this monitoring scheme were incorporated into the Vermont FBMP, then data collection, management, analyses, and reporting would be coordinated by VINS, with the advantage of combining these data with a larger regional dataset for more powerful trend estimates. This monitoring strategy would provide a reasonable tradeoff between minimizing sampling effort (and therefore cost) and maximizing the ability to detect changes.

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Appendix 1. List of 91 potential breeding bird species at SAGA.

Common Name	Scientific Name	Present	Presumed Absent
Green-backed Heron	*Butorides virescens*	x	
Wood Duck	*Aix sponsa*	x	
Mallard	*Anas platyrhynchos*	x	
Hooded Merganser	*Lophodytes cucullatus*	x	
Sharp-shinned Hawk	*Accipiter striatus*		x
Cooper's Hawk	*Accipiter cooperii*		x
Red-shouldered Hawk	*Buteo lineatus*		x
Broad-winged Hawk	*Buteo platypterus*	x	
Red-tailed Hawk	*Buteo jamaicensis*	x	
Ruffed Grouse	*Bonasa umbellus*		x
Wild Turkey	*Meleagris gallopavo*	x	
Spotted Sandpiper	*Actitis macularia*		x
Common Snipe	*Gallinago gallinago*		x
American Woodcock	*Scolopax minor*	x	
Mourning Dove	*Zenaida macroura*	x	
Black-billed Cuckoo	*Coccyzus erythropthalmus*		x
Eastern Screech Owl	*Otis asio*		x
Great Horned Owl	*Bubo virginianus*	x	
Barred Owl	*Strix varia*	x	
Northern Saw-whet Owl	*Aegolius acadicus*		x
Chimney Swift	*Chaetura pelagica*	x	
Ruby-throated Hummingbird	*Archilochus colubris*	x	
Belted Kingfisher	*Ceryle alcyon*	x	
Yellow-bellied Sapsucker	*Sphyrapicus varius*	x	
Downy Woodpecker	*Picoides pubescens*	x	
Hairy Woodpecker	*Picoides villosus*	x	
Northern Flicker	*Colaptes auratus*	x	
Pileated Woodpecker	*Dryocopus pileatus*	x	
Eastern Wood Pewee	*Contopus virens*	x	
Willow Flycatcher	*Empidonax trailii*	x	
Alder Flycatcher	*Empidonax alnorum*	x	
Least Flycatcher	*Empidonax minimus*	x	
Eastern Phoebe	*Sayornis phoebe*	x	
Great Crested Flycatcher	*Miarchus crinitus*	x	
Eastern Kingbird	*Tyrannus tyrannus*	x	
Blue-headed Vireo	*Vireo solitarius*	x	
Warbling Vireo	*Vireo gilvus*		x
Red-eyed Vireo	*Vireo olivaceus*	x	
Blue Jay	*Cyanocitta cristata*	x	
American Crow	*Corvus brachyrhynchos*	x	
Tree Swallow	*Tachycineta bicolor*	x	
Black-capped Chickadee	*Poecile atricapillus*	x	
Eastern Tufted Titmouse	*Baeolophus bicolor*	x	
Red-breasted Nuthatch	*Sitta canadensis*	x	
White-breasted Nuthatch	*Sitta carolinensis*	x	
Brown Creeper	*Certhia americana*	x	
House Wren	*Troglodytes aedon*		x
Winter Wren	*Troglodytes troglodytes*	x	
Golden-crowned Kinglet	*Regulus satrapa*	x	

Appendix 1. Cont.

Appendix 1. Continued.

Common Name	Scientific Name	Present	Presumed Absent
Eastern Bluebird	*Sialia sialis*	x	
Veery	*Catharus fuscescens*	x	
Hermit Thrush	*Catharus guttatus*	x	
Wood Thrush	*Hylocichla mustelina*	x	
American Robin	*Turdus migratorius*	x	
Gray Catbird	*Dumetella carolinensis*	x	
Brown Thrasher	*Toxostoma rufum*		x
European Starling	*Sturnus vulgaris*	x	
Cedar Waxwing	*Bombycilla cedrorum*	x	
Northern Parula	*Parula americana*	x	
Yellow Warbler	*Dendroica petechia*	x	
Chestnut-sided Warbler	*Dendroica pensylvanica*	x	
Magnolia Warbler	*Dendroica magnolia*	x	
Black-throated Blue Warbler	*Dendroica caerulescens*		x
Yellow-rumped Warbler	*Dendroica coronata*	x	
Black-throated Green Warbler	*Dendroica virens*	x	
Blackburnian Warbler	*Dendroica fusca*	x	
Pine Warbler	*Dendroica pinus*	x	
Black-and-White Warbler	*Mniotilta varia*	x	
American Redstart	*Setophaga ruticilla*	x	
Ovenbird	*Seiurus aurocapillus*	x	
Northern Waterthrush	*Seiurus noveboracensis*		x
Louisiana Waterthrush	*Seiurus motacilla*	x	
Common Yellowthroat	*Geothlypis trichas*	x	
Scarlet Tanager	*Piranga olivacea*	x	
Chipping Sparrow	*Spizella passerina*	x	
Savannah Sparrow	*Passerculus sandwichensis*	x	
Song Sparrow	*Melospiza melodia*	x	
Swamp Sparrow	*Melospiza georgiana*	x	
White-throated Sparrow	*Zonotrichia albicollis*	x	
Dark-eyed Junco	*Junco hyemalis*	x	
Northern Cardinal	*Cardinalis cardinalis*	x	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	x	
Indigo Bunting	*Passerina cyanea*	x	
Red-winged Blackbird	*Agelaius phoeniceus*	x	
Common Grackle	*Quiscalus quiscula*	x	
Brown-headed Cowbird	*Molothrus ater*	x	
Baltimore Oriole	*Icterus galbula*	x	
Purple Finch	*Carpodacus purpureus*	x	
House Finch	*Carpodacus mexicanus*		x
Pine Siskin	*Carduelis pinus*	x	
American Goldfinch	*Carduelis tristis*	x	

Appendix 2. Total number of individuals and species encountered at each point count station (<50 m), Saint-Gaudens National Historic Site, Cornish, NH, 2001-2002.

Species	No. of Points	Point Count Station Number										
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
American Robin	10	3	1		7	6	1	1	3	2	2	2
Red-eyed Vireo	10		6	3	3	3	2	5	4	2	3	3
Veery	9	2	3		4	2		2	2	2	5	1
Black-throated Green Warbler	8	1	9	1	2	1	2				2	7
American Redstart	7		2		6	1		2	2	2	1	
Blackburnian Warbler	7	1				1	6		1	5	1	1
Black-capped Chickadee	7	4		2		5		3	1		1	3
Ovenbird	7	3	7	2	2			1		12	6	
White-breasted Nuthatch	6			1		1	1	2		1		4
Pine Warbler	5				3		2	2		1	1	
Wood Thrush	4							1	2	2		2
Blue Jay	3						2		1	1		
Blue-headed Vireo	3				1				1		1	
Brown Creeper	3							3		4	1	
Brown-headed Cowbird	3				4	2					2	
Downy Woodpecker	3					1		1		1		
Hairy Woodpecker	3	1		1								1
Yellow-bellied Sapsucker	3		2								3	2
Yellow-rumped Warbler	3				1	1		1				
American Crow	2				3	1						
Baltimore Oriole	2	1							3			
Black-and-White Warbler	2		1								1	
Cedar Waxwing	2			4	1							
Chipping Sparrow	2				2	13						
Eastern Tufted Titmouse	2	1									1	
Great Crested Flycatcher	2	2										1
Louisiana Waterthrush	2		1				1					
Northern Parula	2	1	3									
Scarlet Tanager	2		1			1						
Song Sparrow	2				2				2			
Winter Wren	2						1			1		
American Goldfinch	1				1							
Barred Owl	1		2									
Chestnut-sided Warbler	1								2			
Common Grackle	1						2					
Common Yellowthroat	1										1	
Eastern Phoebe	1								1			
Eastern Wood Pewee	1		1									
Golden-crowned Kinglet	1									2		
Hermit Thrush	1			1								
Least Flycatcher	1				5							
Magnolia Warbler	1			1								
Northern Flicker	1								1			
Purple Finch	1				2							
Red-breasted Nuthatch	1									1		
Red-winged Blackbird	1								2			
Rose-breasted Grosbeak	1											1
Ruby-throated Hummingbird	1				1							
Swamp Sparrow	1								2			
Total Number of Individuals	337	20	39	16	50	39	20	24	30	39	32	28
Total Number of Species	49	11	13	9	18	14	10	12	16	15	16	12

Appendix 3. Total number of individuals and species encountered at each point count station (unlimited distance), Saint-Gaudens National Historic Site, Cornish, NH, 2001-2002.

	No. of	Point Count Station Number										
Species	**Points**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
American Robin	11	4	1	4	15	12	3	5	8	8	5	9
Eastern Wood Pewee	11	5	3	4	2	1	6	3	5	3	2	5
Ovenbird	11	9	14	5	4	1	3	4	2	17	13	6
Red-eyed Vireo	11	2	9	5	5	5	6	5	9	9	8	6
Black-throated Green Warbler	10	1	11	5	5	1	8	1		2	3	9
Blue Jay	10		1	1	1	2	5	1	2	3	1	3
American Crow	9	2	1	3	3	3	5	1			1	3
Veery	9	9	5		4	3		7	8	6	8	2
American Redstart	8	1	2		8	1		4	2	2	2	
Blackburnian Warbler	8	1				3	6	1	1	9	1	1
Scarlet Tanager	8	1	1	2		1	4	2			1	2
Wood Thrush	8		1		1	2	2	4	2	4		4
Black-capped Chickadee	7	4		3		5		4	1		1	3
Brown-headed Cowbird	7			3	6	14			1	1	2	1
Pine Warbler	7	1			4		4	3		5	6	7
Rose-breasted Grosbeak	7		1		1		2	2		1	1	1
White-breasted Nuthatch	7			1		3	1	2		2	1	4
Baltimore Oriole	6	3	1		1			1	3			1
Downy Woodpecker	6		1			1		1	1	1		1
Great Crested Flycatcher	6	3			1		1	1	2			1
Hermit Thrush	6	1		3	1	2	1			1		
Northern Cardinal	6	1				1		1	1		1	1
Chestnut-sided Warbler	5	4		1				1	4		1	
Mourning Dove	5	1			1		2			2	1	
Song Sparrow	5	4			3			5	8		2	
Yellow-rumped Warbler	5				3	2	2	3		3		
Blue-headed Vireo	4				1				1	1	1	
Common Yellowthroat	4	1						2	1		1	
Eastern Tufted Titmouse	4	1			1				1		1	
Louisiana Waterthrush	4	1	1				1			1		
Red-winged Blackbird	4							8	7		1	1
Yellow-bellied Sapsucker	4		2		1						3	2
Brown Creeper	3							3		5	2	
Chipping Sparrow	3			1	9	18						
Gray Catbird	3	2						1			1	
Hairy Woodpecker	3	2		1								1
Red-breasted Nuthatch	3				1					1		1
Alder Flycatcher	2	1						2				
American Goldfinch	2				1	1						
Barred Owl	2		2									1
Black-and-White Warbler	2		3								2	
Cedar Waxwing	2			4	1							
Eastern Phoebe	2					2			1			
Indigo Bunting	2										2	3
Northern Flicker	2							1	1			
Northern Parula	2	2	4									
Pileated Woodpecker	2				1					1		
Swamp Sparrow	2							3	2			
Winter Wren	2						1			2		
Yellow Warbler	2	1						5				
Common Grackle	1						2					
Golden-crowned Kinglet	1									3		
Green Heron	1						1					
Least Flycatcher	1				6							
Magnolia Warbler	1			1								
Purple Finch	1				3							
Red-tailed Hawk	1	1										
Ruby-throated Hummingbird	1				1							
Willow Flycatcher	1							1				
Total Number of Individuals	834	69	64	47	95	84	66	88	74	93	75	79
Total Number of Species	59	28	19	17	30	22	21	32	24	25	29	26

Appendix 4. UTM Coordinates (NAD 1983) and physical descriptions of breeding bird inventory survey point locations at SAGA, 2001-2002.

Point Number	UTM Y Coordinate	UTM X Coordinate	TYPE	Description
1	4820000	711950	Pt. Count	On 4"dbh hemlock ~20 m east of trail on flat terrace.
2	4820000	712250	Pt. Count/Hawk Survey	On 12" dbh hemlock ~20 m from property corner pin.
3	4820000	712500	Pt. Count	On 6" dbh American beech.
4	4819750	712750	Pt. Count	On 6" dbh black birch near top of wheelchair ramp, just NE of parking area.
5	4819750	712500	Pt. Count	On large red maple at field edge.
6	4819750	712250	Pt. Count	On 3" dbh American beech among huge (30-36" dbh) white pines on north side of trail.
7	4819750	712000	Pt. Count	On 6" dbh red maple on SW side of trail.
8	4819500	712250	Pt. Count	On 8" dbh basswood, just south of strteam crossing and west of trail.
9	4819500	712500	Pt. Count/Hawk Survey	On 3" dbh sugar maple located on property line just south of telephone line R.O.W.
10	4819250	712250	Pt. Count	On 3" dbh maple, ~25 m south of small stream, just above old woods road, south of Park Rd.
11	4818750	712100	Pt. Count/Hawk Survey	On 5" dbh sugar maple located in west-facing bowl below several 30" dbh red oaks.
12	4819791	711849	Owl Survey	NW corner, point is at large white pine leaning over stream with NPS boundary marker.
13	4819129	712172	Owl Survey	150 meters from park entrance off Rt. 12A, point is at second pine on left opposite large, twin-trunked white pine.
14	4819772	712948	Owl Survey	East of park headquarters at road junction.